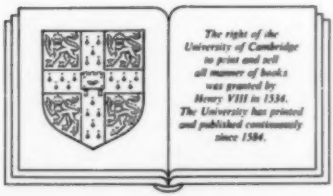
JOURNAL OF FLUID MECHANICS

VOLUME 200

MARCH 1989



CAMBRIDGE UNIVERSITY PRESS

Cambridge

New York Port Chester Melbourne Sydney

Published by the Press Syndicate of the University of Cambridge
The Pitt Building, Trumpington Street, Cambridge CB2 1RP
32 East 57th Street, New York, NY 10022, USA
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

© Cambridge University Press 1989

Printed in Great Britain by the University Press, Cambridge

COPYING

The *Journal* is registered with the Copyright Clearance Center, 27 Congress St., Salem, Mass. 01970. Organizations in the USA which are also registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of $5.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0022-1120/89/$5.00 + .00

ISI Tear Sheet Service, 3501 Market Street, Philadelphia, Pennsylvania 19104, USA is authorized to supply single copies of separate articles for private use only.

For all other use of material from the *Journal* permission should be sought from Cambridge or the American Branch of Cambridge University Press.

SUBSCRIPTIONS

The JOURNAL OF FLUID MECHANICS (ISSN 0022-1120) is published by the Cambridge University Press in 12 volumes each year. All orders must be accompanied by payment. Single volumes cost £38 net (US $75 in the USA and Canada) plus postage. The subscription price in the UK (which includes postage) to volumes 198–209, 1989, is £410, £450 elsewhere (US $880 in the USA and Canada) for institutions: £225 (US $450) for individuals. Copies of the journal for subscribers in the USA and Canada are sent by air to New York. Second class postage is paid at New York, NY, and at additional mailing offices. Claims for missing issues will be considered only if made immediately upon receipt of the subsequent issue. Copies of back numbers are available from Cambridge University Press. POSTMASTER: send address changes in USA and Canada to *Journal of Fluid Mechanics*, Cambridge University Press, 110 Midland Avenue, Port Chester, New York, NY 10573.

Volume 200 March 1989

CONTENTS

An iterative method for high-Reynolds-number flows with closed streamlines. A. J. MESTEL *page* 1

On the stability of high-Reynolds-number flows with closed streamlines. A. J. MESTEL 19

Dynamic simulation of bounded suspensions of hydrodynamically interacting particles. LOUIS J. DURLOFSKY and JOHN F. BRADY 39

Topographic waves in open domains. Part 1. Boundary conditions and frequency estimates. E. R. JOHNSON 69

Topographic waves in open domains. Part 2. Bay modes and resonances. THOMAS F. STOCKER and E. R. JOHNSON 77

The dynamics of the near field of strong jets in crossflows. SERGIO L. V. COELHO and J. C. R. HUNT 95

Transient flow in a side-heated cavity at high Rayleigh number: a numerical study. S. G. SCHLADOW, J. C. PATTERSON and R. L. STREET 121

On flow separation and reattachment around a circular cylinder at critical Reynolds numbers. H. HIGUCHI, H. J. KIM and C. FARELL 149

The effect of order on dispersion in porous media. DONALD L. KOCH, RAYMOND G. COX, HOWARD BRENNER and JOHN F. BRADY 173

The secondary flow and its stability for natural convection in a tall vertical enclosure. ARNON CHAIT and SEPPO A. KORPELA 189

The instability of a liquid film on a wall exposed to an air flow. H. LUDWIEG and H. HORNUNG 217

The complete second-order diffraction solution for an axisymmetric body. Part 1. Monochromatic incident waves. MOO-HYUN KIM and DICK K. P. YUE 235

Slot suction from inviscid channel flow. J. N. DEWYNNE, S. D. HOWISON, J. R. OCKENDON, L. C. MORLAND and E. J. WATSON 265

Area-varying waves on curved vortex tubes with application to vortex breakdown. T. S. LUNDGREN and W. T. ASHURST 283

Investigation of an excited jet diffusion flame at elevated pressure. ANTHONY W. STRAWA and BRIAN J. CANTWELL 309

The effect of interaction on the boundary layer induced by a convected rectilinear vortex. FU-SHENG CHUANG and A. T. CONLISK 337

The relaxation of a turbulent boundary layer in an adverse pressure gradient. ANDREW D. CUTLER and JAMES P. JOHNSTON 367

Second-order recombination in a parallel shear flow. RONALD SMITH 389

Condensation phenomena in a turbine blade passage. S. A. SKILLINGS 409

Nonlinear stability of a weakly supercritical mixing layer in a rotating fluid. I. G. SHUKHMAN 425

Capillary–gravity waves of solitary type on deep water. MICHAEL S. LONGUET-HIGGINS 451

Characteristic-eddy decomposition of turbulence in a channel. PARVIZ MOIN and ROBERT D. MOSER 471

Coherent structure of the convective boundary layer derived from large-eddy simulations. HELMUT SCHMIDT and ULRICH SCHUMANN 511

Direct numerical simulation of stratified homogeneous turbulent shear flows. T. GERZ, U. SCHUMANN and S. E. ELGHOBASHI 563

REVIEWS

Foundations of Radiation Hydrodynamics, by D. Mihalas and B. W. Mihalas; Astrophysical Radiation Hydrodynamics, edited by K. A. Winkler and M. L. Norman 595

Ferrohydrodynamics, by R. E. Rosensweig 597

INDEX TO VOLUME 200 600